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*DISCUSSION AND CORRESPONDENCE.*  
**THE STUDY OF GREEK AND LATIN vs. MODERN LANGUAGES.**

IN his discussion in SCIENCE of May 25th, of the question : 'Should Greek and Latin be required for the degree of Bachelor of Arts,' Professor Stevenson seems to me to slight some points that bear essentially upon the merits of the question, at least so long as the methods and subjects utilized in teaching the modern languages are not materially changed. As matters now stand, I think it may fairly be claimed that, *as a matter of fact*, the bulk of graduates omitting Latin and Greek from their curriculum, are usually found sensibly deficient in broadness of general culture, when placed alongside of graduates from a 'classical' course. As one who has had special occasion to make the comparison, I should rarely choose, outside of scientific discussion, the social companionship of those educated only in the lines of sciences and modern languages, as now commonly carried out.

That as broad an education *can* be given through the modern languages as through the ancient ones, I fully agree, even though I cannot but think that the more complete grammar of the latter imparts a kind of mental training not easily duplicated by the study of German and French ; while the deficiencies of the English language in grammatical forms, however, conducive to its adaptation as a world-language, leaves one who knows *it* alone, peculiarly ignorant of language-structure in general, and hardly capable of a critical understanding of even English literature.

But even admitting that translations of the ancient classics into the chief literary modern languages afford satisfactory access to the writings of the ancient authors through which the civilizations that have so largely shaped our own have been transmitted to us, the fact is that these translations are practically never used in the 'new' education. Wilhelm Tell and Maria Stuart, with a few of the easier prose writings of Goethe, Lessing and others, form the standard works the student sees after he 'absolves' the German readers ; in French, Telemaque constitutes, as a rule, the sole book read that has any reference to classic antiquity.

It is true that the student *can* subsequently read the translations of the classics ; but not one in a hundred does so. The result is that not only bachelors of arts, but even masters of the same, and, sad to say, even some modern doctors of philosophy, are found to be blissfully ignorant of the fact that the Greeks and Romans ever did anything which an enlightened modern scientist is bound to respect. With the bare smattering of history brought from the high school, dimmed by a crowded four-years curriculum, the bachelor too commonly emerges with the impression, if not conviction, that modern time and its brilliant scientific and industrial achievements, is really all that is worth considering. Frequently even the history of his own special science is wholly unfamiliar to him, as may be but too frequently observed in the case of those who have graduated on the basis of 'organic' chemistry, and pride themselves upon their ability to produce new compounds by the score, with the exact structure-formulae in black-and-white, but who barely remember, in a general way, such names as Lavoisier, Davy, and Berzelius, much less what their science owes to these men.

Certainly such ignorance of the history of man, political, philosophical and scientific, as we already so commonly find in the modern college graduate, is a most serious evil ; conducting as it does to a one-sided view of life, and especially to that overweening self-esteem which is not only socially offensive, but vitiates effective scientific work, by the failure to co-ordinate it with that of those who have preceded in similar lines of study. To avoid this narrowness, then, it would be necessary to revise materially the kind and scope of reading done by bachelors of arts in the modern languages.

Freedom of election of studies is a very seductive watchword ; but freedom without corresponding intelligence to make beneficial use of it is a delusion and a snare, in education as well as politically—as this nation has abundant reason to know. One of its not altogether happy results is the proverbial American youth, of both sexes, whose precocity and brightness is but too generally associated with a lack of reverence ('veneration,' *phrenologice*) between which, and the extreme repression of youthful

exuberance in the earlier stages of European education, the choice is frequently painful. It is to be hoped that means may be found to establish a happy mean between the two ; but it is quite certain that among the subjects of education conducive to that end, the history of the intellectual evolution of mankind must find a more conspicuous place than is assigned to it in the latest scheme of higher education. The titles bachelor and master of arts should, in my view, together with the doctor of philosophy, remain the badge of such broader education ; and those who are content with narrow lines should also be content to receive only a corresponding degree. E. W. HILGARD.

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#### PHOSPHORESCENCE IN DEEP-SEA ANIMALS.

IT is stated, among others, by Beddard in his animal coloration that the brilliant and varied colorations of deep-sea animals are totally devoid of meaning, either by way of protection or warning, for the simple reason that not enough light penetrates to the depths of the sea to permit them to be visible. But in a paper on the 'Utility of Phosphorescence in Deep-Sea Animals,' in a late number of the *American Naturalist*, it is maintained by C. C. Nutting that the quantity of phosphorescent light emitted by the animals of the deep sea is very considerable—so great, in fact, as to supply over definite areas of the sea bottom a sufficient illumination to render visible the colors of the animals themselves. This lighting up of the depths of the sea would be of manifest benefit to the various animals which combine to bring it about—it would serve much the same purposes as protective, aggressive, alluring and directive colorations. For the free-swimming animals—fishes, crustaceæ, molluscs, part of the coelenterates, most of the protozoa—the utility of phosphorescence is the more readily obvious ; but since practically all deep-sea forms live exclusively on animal food, and since it is well known that light exerts a strangely attractive power on widely different forms of animal life, the fixed species would also enjoy at least the benefit of attracting their prey. A very large number of crustaceans are phosphorescent, often brilliantly so ; many of them have large eyes

and are particularly active in movement and voracious in appetite ; they feed on minute organisms for the most part, and it can hardly be doubted that they often use their phosphorescent powers for the purpose of illuminating their surroundings and revealing their prey. Certain cephalopods secured by the *Challenger* have been made out to have a highly specialized apparatus designed to reflect light from their phosphorescent bodies downward to the bottom over which it passes ; in this case there is not only light but also a reflector, an efficient bull's eye lantern for use in hunting through the abyssal darkness.

Among the ctenophores and medusæ we encounter amazing displays of the 'living light' ; as these animals have eye-spots, and seem to be able to distinguish light, their phosphorescence may serve to keep them together in groups and thus effect the same end as directive coloration among vertebrates and insects. It is important to note that blind species of groups normally possessed of eyes are seldom if ever phosphorescent. Noctilucca and other allied Protozoa are often found at considerable depths, and hence come under the head of deep-sea forms, but they differ from the organisms already mentioned in having no recognized organs of sight, and also in an extreme simplicity of organization. They, however, occur in enormous swarms and hence must have some means of keeping together, and moreover, they have been proved to be, although eyeless, extremely sensitive to light. In fact, it is practically certain that sensitiveness to light is a fundamental property of simple protoplasm. It is easy to conceive, therefore, that in these little creatures their phosphorescence is directive in function ; the same thing is doubtless the case with a medusa of the subtropical Atlantic, which thickly covers hundreds of square miles of surface, and which glows like a living coal at night.

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#### CURRENT NOTES ON METEOROLOGY.

##### BALLOON METEOROLOGY.

THE rapid development of what may well be called balloon meteorology has resulted in the